Table 1: Propensity Model Features

| Surgery | Features |
| --- | --- |
| Femoral Derotation Osteotomy | Era, Age, Diagnosis, Diagnosis Modifier, Trochanteric Prominence Angle,Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum InternalHip Rotation, Weightbearing Forefoot Varus/Valgus, Weightbearing ForefootVarus/Valgus Severity, Weightbearing Forefoot Ab/Adduction, WeightbearingForefoot Ab/Adduction Severity, Prior Tibial Derotation Osteotomy, PriorFemoral Derotation Osteotomy, Mean Stance Pelvis Angle Transverse Plane,Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle TransversePlane, Mean Stance Foot Angle Transverse Plane |
| Tibial Derotation Osteotomy | Era, Age, Diagnosis, Diagnosis Modifier, Trochanteric Prominence Angle,Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum InternalHip Rotation, Weightbearing Forefoot Varus/Valgus, Weightbearing ForefootVarus/Valgus Severity, Weightbearing Forefoot Ab/Adduction, WeightbearingForefoot Ab/Adduction Severity, Prior Tibial Derotation Osteotomy, PriorFemoral Derotation Osteotomy, Mean Stance Pelvis Angle Transverse Plane,Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle TransversePlane, Mean Stance Foot Angle Transverse Plane |
| Psoas Release | Era, Age, Diagnosis, Diagnosis Modifier, Hip Flexor Strength, PoplitealAngle (Unilateral), Maximum Hip Extension, Prior Adductor Release, PriorPsoas Release, Prior Hams Lengthening, Prior Rectus Transfer, Mean StancePelvis Angle Sagittal Plane, Minimum Stance Pelvis Angle Sagittal Plane,Minimum Stance Hip Angle Sagittal Plane, Maximum Stance Pelvis Angle Sagittal Plane |
| Hams Lengthening | Era, Age, Diagnosis, Diagnosis Modifier, Maximum Knee Extension, PoplitealAngle (Unilateral), Prior Adductor Release, Prior Psoas Release, Prior HamsLengthening, Initial Contact Pelvis Angle Sagittal Plane, Initial ContactKnee Angle Sagittal Plane, Mean Stance Knee Angle Sagittal Plane, MinimumStance Knee Angle Sagittal Plane, Mean Swing Pelvis Angle Sagittal Plane,Minimum Swing Pelvis Angle Sagittal Plane, Maximum Swing Pelvis Angle Sagittal Plane |
| Adductor Release | Era, Age, Diagnosis, Diagnosis Modifier, Maximum Hip Abduction (KneeExtended), Maximum Hip Abduction (Knee Flexed), Hip Abductor Strength,Prior Adductor Release, Prior Psoas Release, Prior Hams Lengthening,Initial Contact Hip Angle Coronal Plane, Maximum Stance Hip Angle CoronalPlane, Minimum Swing Hip Angle Coronal Plane |
| Gastroc Soleus Lengthening | Era, Age, Diagnosis, Diagnosis Modifier, Maximum Ankle Dorsiflexion(Knee Extended), Maximum Ankle Dorsiflexion (Knee Flexed), MaximumKnee Extension, Plantarflexor Spasticity, Plantarflexor Strength,Non-Weightbearing Hindfoot Varus/Valgus, Non-Weightbearing HindfootVarus/Valgus Severity, Weightbearing Foot Position, Weightbearing FootPosition Severity, Prior Gastroc Soleus Lengthening, Initial Contact KneeAngle Sagittal Plane, Initial Contact Ankle Angle Sagittal Plane, MinimumStance Ankle Angle Sagittal Plane, Maximum Stance Ankle Angle SagittalPlane, Minimum Swing Ankle Angle Sagittal Plane |
| DFEO | Era, Age, Diagnosis, Diagnosis Modifier, Extensor Lag, Maximum KneeExtension, Patella Alta, Prior Hams Lengthening, Prior DFEO, Prior PatellarAdvance, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| Patellar Advance | Era, Age, Diagnosis, Diagnosis Modifier, Extensor Lag, Maximum KneeExtension, Patella Alta, Prior Hams Lengthening, Prior DFEO, Prior PatellarAdvance, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| Foot and Ankle Bone | Era, Age, Diagnosis, Diagnosis Modifier, Non-Weightbearing Arch,Non-Weightbearing Forefoot Varus/Valgus, Non-Weightbearing ForefootVarus/Valgus Severity, Non-Weightbearing Hindfoot Varus/Valgus,Non-Weightbearing Hindfoot Varus/Valgus Severity, Non-Weightbearing MidfootMotion, First Ray Plantarflexion, Weightbearing Forefoot Varus/Valgus,Weightbearing Forefoot Varus/Valgus Severity, Weightbearing ForefootAb/Adduction, Weightbearing Forefoot Ab/Adduction Severity, WeightbearingFoot Position, Weightbearing Foot Position Severity, Weightbearing MidfootPosition, Prior Foot and Ankle Bone, Prior Foot and Ankle Soft Tissue, MeanStance Foot Angle Transverse Plane |
| Foot and Ankle Soft Tissue | Era, Age, Diagnosis, Diagnosis Modifier, Non-Weightbearing Arch,Non-Weightbearing Forefoot Varus/Valgus, Non-Weightbearing ForefootVarus/Valgus Severity, Non-Weightbearing Hindfoot Varus/Valgus,Non-Weightbearing Hindfoot Varus/Valgus Severity, Non-Weightbearing MidfootMotion, First Ray Plantarflexion, Weightbearing Forefoot Varus/Valgus,Weightbearing Forefoot Varus/Valgus Severity, Weightbearing ForefootAb/Adduction, Weightbearing Forefoot Ab/Adduction Severity, WeightbearingFoot Position, Weightbearing Foot Position Severity, Weightbearing MidfootPosition, Prior Foot and Ankle Bone, Prior Foot and Ankle Soft Tissue, MeanStance Foot Angle Transverse Plane, Mean Swing Foot Angle Transverse Plane |
| Neural Rhizotomy | Era, Age, Diagnosis, Diagnosis Modifier, Adductor Spasticity, HamstringSpasticity, Plantarflexor Spasticity, Rectus Femoris Spasticity, PriorNeural Rhizotomy, Initial Contact Knee Angle Sagittal Plane, InitialContact Ankle Angle Sagittal Plane, Maximum Stance Ankle Angle SagittalPlane, Mean Swing Ankle Angle Sagittal Plane, GMFCS |
| Rectus Transfer | Era, Age, Diagnosis, Diagnosis Modifier, Rectus Femoris Spasticity, PriorRectus Transfer, Initial Contact Knee Angle Sagittal Plane, Maximum SwingKnee Angle Sagittal Plane |

Table 2: Chosen Outcomes  
Note: Outcomes for each surgery **also** include GDI and FAQT

| Surgery | Features |
| --- | --- |
| Femoral Derotation Osteotomy | Trochanteric Prominence Angle, Mean Stance Hip Angle Transverse Plane |
| Tibial Derotation Osteotomy | Bimalleolar Axis Angle, Mean Stance Knee Angle Transverse Plane |
| Psoas Release | Maximum Hip Extension, Minimum Stance Hip Angle Sagittal Plane |
| Hams Lengthening | Popliteal Angle (Unilateral), Initial Contact Knee Angle Sagittal Plane |
| Adductor Release | Maximum Hip Abduction (Knee Extended), Minimum Swing Hip Angle Coronal Plane |
| Gastroc Soleus Lengthening | Maximum Ankle Dorsiflexion (Knee Extended), Maximum Stance Ankle Angle Sagittal Plane |
| DFEO | Maximum Knee Extension, Minimum Stance Knee Angle Sagittal Plane |
| Patellar Advance | Extensor Lag, Minimum Stance Knee Angle Sagittal Plane |
| Foot and Ankle Bone | Overall Weightbearing Foot Deformity, Mean Stance Foot Angle Transverse Plane |
| Foot and Ankle Soft Tissue | Overall Non-Weightbearing Foot Deformity, Mean Stance Foot Angle Transverse Plane |
| Neural Rhizotomy | Overall Spasticity, Mean Stance Ankle Angle Sagittal Plane |
| Rectus Transfer | Maximum Knee Flexion, Maximum Swing Knee Angle Sagittal Plane |

Table 3: Outcome Prediction Model Features

Note: All prediction models also include big-12 interval surgeries, age, and GMFCS level

| Outcome | Features |
| --- | --- |
| ∆ Trochanteric Prominence Angle | EOS Femoral Anteversion, EOS Bimalleolar Axis Angle, Trochanteric prominence Angle, Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum Internal Hip Rotation, Mean Stance Pelvis Angle Transverse Plane, Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle Transverse Plane, Mean Stance Foot Angle Transverse Plane |
| ∆ Mean Stance Hip Angle Transverse Plane | EOS Femoral Anteversion, EOS Bimalleolar Axis Angle, Trochanteric prominence Angle, Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum Internal Hip Rotation, Mean Stance Pelvis Angle Transverse Plane, Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle Transverse Plane, Mean Stance Foot Angle Transverse Plane |
| ∆ Gait Deviation Index | Overall Spasticity, Overall Weightbearing Foot Deformity, Overall Non-Weightbearing Foot Deformity, EOS Femoral Anteversion, EOS Bimalleolar Axis Angle, Maximum Ankle Dorsiflexion (Knee Extended), Maximum Ankle Dorsiflexion (Knee Flexed), Trochanteric Prominence Angle, Bimalleolar Axis Angle, Extensor Lag, Maximum External Hip Rotation, Maximum Internal Hip Rotation, Maximum Knee Extension, Patella Alta, Popliteal Angle(Unilateral), Gait Deviation Index, Maximum Hip Extension, Initial Contact Pelvis Angle Coronal Plane, Initial Contact Pelvis Angle Sagittal Plane, Initial Contact Pelvis Angle Transverse Plane, Initial Contact Hip Angle Coronal Plane, Initial Contact Hip Angle Sagittal Plane, Initial Contact Hip Angle Transverse Plane, Initial Contact Knee Angle Sagittal Plane, Initial Contact Ankle Angle Sagittal Plane, Initial Contact Foot Angle Transverse Plane, Opposite Foot Off Pelvis Angle Coronal Plane, Opposite Foot Off Pelvis Angle Sagittal Plane, Opposite Foot Off Pelvis Angle Transverse Plane, Opposite Foot Off Hip Angle Coronal Plane, Opposite Foot Off Hip Angle Sagittal Plane, Opposite Foot Off Hip Angle Transverse Plane, Opposite Foot Off Knee Angle Sagittal Plane, Opposite Foot Off Ankle Angle Sagittal Plane, Opposite Foot Off Foot Angle Transverse Plane, Opposite Foot Contact Pelvis Angle Coronal Plane, Opposite Foot Contact Pelvis Angle Sagittal Plane, Opposite Foot Contact Pelvis Angle Transverse Plane, Opposite Foot Contact Hip Angle Coronal Plane, Opposite Foot Contact Hip Angle Sagittal Plane, Opposite Foot Contact Hip Angle Transverse Plane, Opposite Foot Contact Knee Angle Sagittal Plane, Opposite Foot Contact Ankle Angle Sagittal Plane, Opposite Foot Contact Foot Angle Transverse Plane, Foot Off Pelvis Angle Coronal Plane, Foot Off Pelvis Angle Sagittal Plane, Foot Off Pelvis Angle Transverse Plane, Foot Off Hip Angle Coronal Plane, Foot Off Hip Angle Sagittal Plane, Foot Off Hip Angle Transverse Plane, Foot Off Knee Angle Sagittal Plane, Foot Off Ankle Angle Sagittal Plane, Foot Off Foot Angle Transverse Plane, Mid-Swing Pelvis Angle Coronal Plane, Mid-Swing Pelvis Angle Sagittal Plane, Mid-Swing Pelvis Angle Transverse Plane, Mid-Swing Hip Angle Coronal Plane, Mid-Swing Hip Angle Sagittal Plane, Mid-Swing Hip Angle Transverse Plane, Mid-Swing Knee Angle Sagittal Plane, Mid-Swing Ankle Angle Sagittal Plane, Mid-Swing Foot Angle Transverse Plane |
| ∆ Functional Assessment Questionnaire Transform | Overall Spasticity, Overall Weightbearing Foot Deformity, Overall Non-Weightbearing Foot Deformity, Functional Assessment Questionnaire Transform |
| ∆ Bimalleolar Axis Angle | EOS Femoral Anteversion, EOS Bimalleolar Axis Angle, Trochanteric prominence Angle, Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum Internal Hip Rotation, Mean Stance Pelvis Angle Transverse Plane, Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle Transverse Plane, Mean Stance Foot Angle Transverse Plane |
| ∆ Mean Stance Knee Angle Transverse Plane | EOS Femoral Anteversion, EOS Bimalleolar Axis Angle, Trochanteric prominence Angle, Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum Internal Hip Rotation, Mean Stance Pelvis Angle Transverse Plane, Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle Transverse Plane, Mean Stance Foot Angle Transverse Plane |
| ∆ Maximum Hip Extension | Popliteal Angle (Unilateral), Maximum Hip Extension, Mean Stance Pelvis Angle Sagittal Plane, Minimum Stance Pelvis Angle Sagittal Plane, Minimum Stance Hip Angle Sagittal Plane, Maximum Stance Pelvis Angle Sagittal Plane |
| ∆ Minimum Stance Hip Angle Sagittal Plane | Popliteal Angle (Unilateral), Maximum Hip Extension, Mean Stance Pelvis Angle Sagittal Plane, Minimum Stance Pelvis Angle Sagittal Plane, Minimum Stance Hip Angle Sagittal Plane, Maximum Stance Pelvis Angle Sagittal Plane |
| ∆ Popliteal Angle (Unilateral) | Popliteal Angle (Unilateral), Initial Contact Pelvis Angle Sagittal Plane, Initial Contact Knee Angle Sagittal Plane, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| ∆ Initial Contact Knee Angle Sagittal Plane | Popliteal Angle (Unilateral), Initial Contact Pelvis Angle Sagittal Plane, Initial Contact Knee Angle Sagittal Plane, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| ∆ Maximum Hip Abduction (Knee Extended) | Maximum Hip Abduction (Knee Extended), Initial Contact Hip Angle Coronal Plane, Maximum Stance Hip Angle Coronal Plane, Minimum Swing Hip Angle Coronal Plane |
| ∆ Minimum Swing Hip Angle Coronal Plane | Maximum Hip Abduction (Knee Extended), Initial Contact Hip Angle Coronal Plane, Maximum Stance Hip Angle Coronal Plane, Minimum Swing Hip Angle Coronal Plane |
| ∆ Maximum Ankle Dorsiflexion (Knee Extended) | Maximum Ankle Dorsiflexion (Knee Extended), Maximum Ankle Dorsiflexion(Knee Flexed), Initial Contact Knee Angle Sagittal Plane, Initial Contact Ankle Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane, Maximum Stance Ankle Angle Sagittal Plane, Minimum Swing Ankle Angle Sagittal Plane |
| ∆ Maximum Stance Ankle Angle Sagittal Plane | Maximum Ankle Dorsiflexion (Knee Extended), Maximum Ankle Dorsiflexion(Knee Flexed), Initial Contact Knee Angle Sagittal Plane, Initial Contact Ankle Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane, Maximum Stance Ankle Angle Sagittal Plane, Minimum Swing Ankle Angle Sagittal Plane |
| ∆ Maximum Knee Extension | Extensor Lag, Maximum Knee Extension, Patella Alta, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| ∆ Minimum Stance Knee Angle Sagittal Plane | Extensor Lag, Maximum Knee Extension, Patella Alta, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| ∆ Extensor Lag | Extensor Lag, Maximum Knee Extension, Patella Alta, Mean Stance Knee Angle Sagittal Plane, Minimum Stance Knee Angle Sagittal Plane |
| ∆ Overall Weightbearing Foot Deformity | Overall Weightbearing Foot Deformity, Weightbearing Forefoot Varus/Valgus, Weightbearing Forefoot Varus/Valgus Severity, Weightbearing Forefoot Ab/Adduction, Weightbearing Forefoot Ab/Adduction Severity, Weight bearing Foot Position, Weightbearing Foot Position Severity, Weightbearing Midfoot Position, Mean Stance Foot Angle Transverse Plane |
| ∆ Mean Stance Foot Angle Transverse Plane | EOS Femoral Anteversion, EOS Bimalleolar Axis Angle, Trochanteric prominence Angle, Bimalleolar Axis Angle, Maximum External Hip Rotation, Maximum Internal Hip Rotation, Mean Stance Pelvis Angle Transverse Plane, Mean Stance Hip Angle Transverse Plane, Mean Stance Knee Angle Transverse Plane, Mean Stance Foot Angle Transverse Plane |
| ∆ Overall Non-Weightbearing Foot Deformity | Overall Non-Weightbearing Foot Deformity, Non-Weightbearing Arch, Non-Weightbearing Forefoot Varus/Valgus, Non-Weightbearing Forefoot Varus/Valgus Severity, Non-Weightbearing Hindfoot Varus/Valgus, Non-Weightbearing Hindfoot Varus/Valgus Severity, Non-Weightbearing Midfoot Motion, First Ray Plantarflexion, Mean Stance Foot Angle Transverse Plane, Mean Swing Foot Angle Transverse Plane |
| ∆ Overall Spasticity | Overall Spasticity, Adductor Spasticity, Hamstring Spasticity, Plantarflexor Spasticity, Rectus Femoris Spasticity |
| ∆ Mean Stance Ankle Angle Sagittal Plane | Overall Spasticity, Hamstring Spasticity, Plantarflexor Spasticity, Initial Contact Knee Angle Sagittal Plane, Initial Contact Ankle Angle Sagittal Plane, Mean Stance Knee Angle Sagittal Plane, Mean Stance Ankle Angle Sagittal Plane, Mean Swing Ankle Angle Sagittal Plane, Maximum Swing Knee Angle Sagittal Plane |
| ∆ Maximum Knee Flexion | Maximum Knee Flexion, Rectus Femoris Spasticity, Initial Contact Knee Angle Sagittal Plane, Mean Stance Knee Angle Sagittal Plane, Maximum Swing Knee Angle Sagittal Plane |
| ∆ Maximum Swing Knee Angle Sagittal Plane | Overall Spasticity, Rectus Femoris Spasticity, Initial Contact Knee Angle Sagittal Plane, Mean Stance Knee Angle Sagittal Plane, Maximum Swing Knee Angle Sagittal Plane |